



Higher Education

in the Era of Artificial Intelligence

INTRODUCTION

Artificial Intelligence (AI), as a technological tool that emulates human cognition and decision-making processes, stands out as the most influential and promising technology currently, introducing boundless and yet-to-be-explored possibilities. Despite continuous expectations regarding the application of AI in education, the unveiling of ChatGPT by OpenAI at the end of 2022 has tangibly demonstrated the limitless potential brought about by AI technology. The current state of AI predominantly falls under the Artificial Narrow Intelligence (ANI) category, specifically designed to perform well-defined tasks within limited domains, such as responding to questions based on input, highlighting its task-specific nature while lacking general intelligence. [1]

ChatGPT, ERNIE Bot, SparkDesk, BingAI, Google Bard, and other AI-driven chatbots are examples of ANI. From a conceptual perspective, Artificial General Intelligence (AGI) refers to machines with intelligence at a human level, capable of performing any intellectual task that humans can complete. Although AGI models are currently in the theoretical stage, the realisation of AGI is undoubtedly approaching with the continuous iteration of ANI.

While envisioning the future, the education sector has maintained a cautious and somewhat lagging approach to considering and applying AI technology. Emerging AI tools, such as Generative AI (GenAI) based on Large Language Models (LLM), Intelligent Tutoring Systems (ITS), and various AI-driven applications and online services, theoretically have the potential to transform teaching, research, talent development, and institutional management. [2] Nevertheless, whether institutions have adequately prepared to address the changes brought about by AI and possess a clear understanding of how to integrate AI into the education system remains uncertain.

In June 2023, Stefania Giannini, Assistant Director-General for Education at UNESCO, stated in *Generative AI and the Future of Education* that "Generative AI opens new horizons and challenges for education. But we urgently need to take action to ensure that new AI technologies are integrated into education on our terms." [3] Despite rapid developments in AI in some countries, many developing countries have yet to widely adopt AI in higher education institutions (HEIs).

In this era, we must contemplate the effective integration of AI with higher education. As a Category II centre focusing on higher education in China, the International Centre for Higher Education Innovation under the auspices of UNESCO (UNESCO-ICHEI) will attempt to explore the possibilities of the effective use of AI technology in higher education in this white paper. It advocates collaborative efforts among all stakeholders in higher education to promote the ethical use of technology and the development of relevant policies.

This report consists of four chapters, including the opportunities and challenges for higher education in the era of AI, the opportunities and challenges brought by the AI industry and its integration with education, policy directions related to AI in various countries and coping strategies for institutions. The vision and prospects of UNESCO-ICHEI and the International Institute of Online Education (IIOE) depicted in this white paper aim to illustrate AI technology's responsible and ethical integration with higher education by scanning current research and surveying relevant stakeholders. This report has openly collected voices of partners and experts that attended the "Transforming Higher Education in the Age of AI" IIOE 2023 Global Partners Summit and attempts to provide a comprehensive overview of AI-related issues in higher education for the IIOE partner network's institutions and educators, presenting concrete solutions and potential roadmap to support stakeholders in the reasonable use of technology and tools, achieving high-quality and equitable higher education, and contributing to the achievement of sustainable development goals (SDGs).

[1] UNESCO IESALC, ChatGPT and Artificial Intelligence in Higher Education Quick Start Guide, https://www.iesalc.unesco.org/wp-content/uploads/2023/04/ChatGPT-and-Artificial-Intelligence-in-higher-education-Quick-Start-guide_EN_FINAL.pdf

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[3] Generative Artificial Intelligence in Education: What are the opportunities and challenges? <https://www.unesco.org/en/articles/generative-artificial-intelligence-education-what-are-opportunities-and-challenges>



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The International Centre for Higher Education Innovation under the auspices of UNESCO (Shenzhen, China) was established on June 8th, 2016, and is the tenth Education Sector UNESCO Category 2 centre in the world. On November 13th, 2015, the 38th General Conference of UNESCO approved the establishment of UNESCO-ICHEI in Shenzhen, China, which is the first Category 2 centre for higher education in China.

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01

Chapter 1

Opportunities, Challenges, and Visions for AI Integration in Higher Education

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Based on existing research, this chapter summarizes the opportunities and challenges of AI integration into higher education. On the one hand, it explores how AI can empower higher education and contribute to achieving Sustainable Development Goal 4 (SDG4) by ensuring inclusive and equitable quality education for all, and promoting lifelong learning opportunities. On the other hand, this chapter also discusses the challenges of AI in higher education, including academic integrity risks, ethical concerns, and the digital divide. The effective integration of AI with higher education depends heavily on enhancing teaching personnel competencies, while also demanding ethical and responsible use of AI technology by stakeholders in higher education.

This chapter also presents a future vision for AI integration

in higher education. From this perspective, the chapter attempts to outline roadmaps, calling on policymakers, HEIs, and Edtech enterprises to act jointly to innovate higher education and reshape the new ecosystem in the AI era. UNESCO-ICHEI is poised to take a pivotal role by providing policy guidance and recommendations, promoting teaching personnel competency frameworks, fostering international multilateral collaboration, and supporting projects on effective AI integration in education. Only through collective action and system-wide commitment can we co-create a new ecosystem, fully harness the potential of AI, and accelerate the realization of inclusive, equitable, and quality education and lifelong learning for all.

1.1. Opportunities of AI for SDG4

AI holds intriguing promise as an enabling technology that could assist in progress towards the SDG4 of ensuring inclusive and equitable quality education and promoting lifelong learning for all. This section details the opportunities of AI applications to help advance education inclusion, enhance the quality of teaching and learning, and expand lifelong learning opportunities.

1.1.1. Inclusive and Equitable Education

Developmental factors hinder underdeveloped countries, regions, and marginalized groups from accessing quality higher education. However, emerging AI technologies offer new opportunities to create a more inclusive and extensive learning environment. If AI is considered a tool to support institutional reform, particularly in terms of expanding reach and promoting educational inclusivity, it can facilitate inclusive education in various ways:

Expanding Access to High-Quality Teaching

In underdeveloped countries and regions with limited educational resources and severe faculty shortages, a few HEIs often need to cater to a large number of learners. Institutions can significantly enhance management efficiency and broaden their scope by leveraging AI-supported infrastructure, extending the boundaries and capacity of institutional services[1]. Using AI's data insights and prediction capabilities, institutions can make informed decisions regarding resource allocation and planning. Additionally, AI can enhance efficiency and offer more possibilities in enrollment, course recommendations, and flexible and open learning pathways. For instance, offering AI-driven laboratories on virtual platforms can address equipment shortages in impoverished areas, enabling students to gain hands-on experience in STEM disciplines.

Promoting Inclusion in the classroom

AI can autonomously identify the personalized needs of diverse learners, offering adaptive suggestions to enhance classroom inclusivity and provide personalized support for students facing learning challenges [2]. For example, AI analysis based on behavioral cues and participation patterns can propose new approaches, recommend courses and learning paths, and assist institutions in the early detection of students facing academic challenges or considering dropping out. AI counselors can help students with cognitive difficulties grasp concepts, while intelligent agents can automatically adjust teaching strategies based on different learning preferences. Therefore, AI is conducive to creating a more inclusive teaching environment, allowing learners to feel recognized, valued, and empowered to unleash their potential.

Improving Accessibility for All Learners

AI, through machine learning and generalization capabilities, continuously optimizes language translation and speech-to-text conversion across different languages. Presently, machine translation tools can rapidly convert text into multiple languages, breaking down language barriers for non-native speakers. Features such as text-to-speech and subtitle generation provide more convenient learning opportunities for visually impaired individuals. The emergence of virtual embodiment technology for sign language translation opens new avenues for content comprehension. This significantly addresses the issue of marginalized and minority populations accessing the same educational resources, contributing to the creation of a more equitable environment where learners are no longer confined by educational accessibility gaps. With universal design principles and human empathy, AI-assisted tools facilitate safeguarding the right to quality education for all.

1.1.2 Quality Education

If AI technology is considered a tool to support teaching and enhance the quality of education, AI can serve as a powerful assistant for teaching personnel, significantly improving the learning experience, particularly in the following three aspects [3]:

Enabling Personalised Learning at Scale

One of the greatest potentials of AI in enhancing education quality is the fundamental expansion of personalised and adaptive education on a large scale. Intelligent tutoring systems can provide each student with a tailored learning path, exercises, and feedback. Virtual tutors act as personalised assistants, helping learners navigate core knowledge points. Advanced algorithms can analyze each student's strengths, weaknesses, interests, and emotions, adjusting teaching and resources accordingly to serve large classrooms of hundreds of individuals.

Creating Dynamic, Interactive and Engaging Learning Experiences

Through highly dynamic, interactive, and immersive learning experiences, AI contributes to increased student engagement. Intelligent tutoring systems offer role-playing exercises guided by conversational AI, allowing learners to experiment in realistic environments with immediate feedback on their actions. AI-adaptive courses gamify learning progress through points, leaderboards, and reward systems, unlocking new levels based on mastery levels. Chatbots facilitate interactive teaching, making education a unique social activity. These enhanced learning experiences can stimulate higher levels of engagement, creativity, and mastery of knowledge.

Utilizing Predictability of AI for Learning Diagnostic and Precision Teaching and Learning

With the support of learning analytics and AI technology, AI can predict difficulties students may encounter. AI-generated assessments and visualization features can identify knowledge gaps, improve teaching processes, and enhance individual learning outcomes through continuous optimization. AI teaching tools can strengthen targeted tutoring with a focus on individual needs. However, this requires educational institutions to have mature digital learning systems and infrastructure, and educators need appropriate guidance skills to utilize these predictive capabilities effectively.

1.1.3 Lifelong Learning

The rise of AI has created a demand for continuous learning and development. Educators and learners need to continuously enhance their skills to ensure efficiency and upgrading of impact in industrial transformations. Additionally, the requirements for AI literacy, related privacy, ethics, understanding, and usage drive people to continuously learn through HEIs, fostering new vitality in higher education. AI also holds significant potential in supporting lifelong learning for teaching personnel, enabling them to acquire new skills, concepts, and knowledge, and cultivating a culture of continuous self-improvement within the profession. For instance, teaching personnel can utilize GenAI for research work, requesting the latest abstracts of academic literature relevant to their disciplinary field and educational environments. Lifelong learning in the age of AI is learning to learn with GenAI, achieving the requirements of future society in the iterative process of knowledge and skills.

Leveraging GenAI Technology to Support Rapid and In-Depth Learning

According to *Guide of Generative AI in Education and Research* [4], GenAI technology can rapidly clarify key knowledge and learning paths in a particular domain, effectively enhancing learning efficiency and lowering the barriers to lifelong learning. This accelerates the accumulation of professional knowledge for anyone.

Learning Needs Driven by and Massive Knowledge Created by the AI Industry

The upgrading of industries has driven a substantial demand for talent. Consequently, based on their own research and knowledge frameworks, suppliers and developers of AI services will offer course resources to higher education and society, ensuring that the industry keeps pace with technological developments. This trend provides higher education with lifelong learning opportunities from the industry, enabling higher education to rapidly keep up with knowledge updates and iterations.

1.2 Challenges of AI in Higher Education

The impact of technology is always a double-sided sword. While students and young individuals tend to embrace technology optimistically, regulation at the national and institutional levels, and monitoring and assessment of ethical mechanisms are often lagging. This section will summarize the current overarching challenges in higher education.

1.2.1 Academic Integrity Risks

Emergent AI technologies raise pressing concerns regarding safeguarding academic integrity and promoting students' responsible use of AI. While AI has displayed the potential to enhance various aspects of teaching and learning, as discussed above, powerful GenAI models also enable new forms of misuse that could severely undermine the central aims of education if poorly managed and governed in higher education.

Specifically, if students excessively rely on LLMs such as GPT, there is a potential risk of hindering their higher-order thinking processing and internalization of knowledge during the learning process, consequently reducing the quality and efficacy of learning, creating opportunities for cheating and plagiarism. Students may be tempted to use LLM to complete entire assignments from start to finish. However, this circumvents key learning objectives – the mere copying of AI output impedes developing skills in analysis, synthesis, and articulation [5]. Overreliance on generative AI to shortcut academic work strips away opportunities for meaningful learning experiences that foster higher-order thinking skills. From the educational policy and administration perspective, it also poses new challenges in preventing technological misuse.

1.2.2 Ethical Considerations

Collecting vast student datasets poses pressing privacy risks that require safeguards and oversight. As products of their algorithms and training data, AI systems can perpetuate or amplify social biases if fairness is not proactively built into their design. The lack of transparency about how many AI models make decisions raises accountability concerns, especially when those decisions shape student trajectories. While AI could enrich learning, over-reliance may diminish human interactions crucial for socio-emotional development and mental health. Another major challenge is that many existing AIs have yet to reflect diverse cultures, languages, and socioeconomic backgrounds, so the relevance and usability of AI for underserved regions could be a concern.

In addition, from November 2022 to the present, several HEIs have experienced a shift in attitude towards banning the use of GenAI, to limited use of GenAI, and finally to providing support for the rational use of GenAI tools, which reflects a transformation in policy and ethical considerations. In the subsequent chapters of this white paper, we will elaborate on the regulatory changes in countries and institutions and the current concerns that need to be addressed at the ethical and regulatory levels of AI and GenAI.

1.2.3 A "Second-Level" Digital Divide

While efforts to increase access to technology and connectivity have reduced digital divides, the risk of inequities surrounding the ability to benefit from AI in education persists. Providing access to robust AI systems does not automatically confer the competencies to employ them productively and meaningfully. This risks privileging already-advantaged student populations concentrated in well-resourced institutions and districts. These privileged groups are more likely to gain early exposure and build literacy with potentially learning-enhancing AI technologies. With robust infrastructure, teacher readiness, curricular integration, and overall competencies to deploy AI effectively, advantaged students will make more progress[6]. Meanwhile, marginalised communities lacking access to AI technologies or capabilities could remain left out, with aggravating digital gaps, and widening disadvantages in innovation or connection to the modern workforce. Underserved learners could lag even further without focused efforts to build holistic AI readiness across resources, training, pedagogy, and infrastructure.

1.2.4 "Imbalance and Uncertainty" in Talent Development

Traditional higher education emphasizes cultivating students' professional skills. However, the advent of AI and GenAI has significantly increased the substitutability of knowledge-intensive jobs driven solely by professional knowledge [7]. Future work may require more collaboration between humans and machines, emphasizing stronger soft skills. However, currently there is no clear consensus in higher education on the development of future curriculums and talent cultivation. The ongoing debate raises issues about what talents higher education should nurture and what talents will be needed in the future. The alignment between talent and employment development may become imbalanced without changes in the training models and curriculum structures in response to future demands. Educators and institutions have yet to define specific measures or set goals to respond to the era of AI, resulting in a cautious and somewhat delayed response to AI integration in education. However, there is a shared need for understanding emerging technologies and developing AI-related literacy. How to respond to these needs and foster collaborative communication between institutions and industries is crucial; otherwise, the output of higher education may fall into a state of imbalance and uncertainty.

**Note: The first-level digital divide refers to the gap in accessing information and communication technologies (ICT), that is, whether there is an opportunity to use technological tools and devices [6]. As more countries and regions have been able to access the Internet and devices than before, the concept of the digital divide has been further expanded. The second-level digital divide refers to the disparity in ICT competency[9]. In the realm of higher education, the competencies to use technology impact the quality of education.

1.2.5 A Need for Universal AI Literacy

Whether it is educators, or students, the universal awareness and gradually mastery of AI literacy is crucial. Educators and learners need to have a clear understanding of the opportunities and risks that AI presents for pedagogy, and identify the how AI impacts teaching and learning. At the same time, administrators and regulators of HEIs and stakeholders of HE should clarify the definition of AI literacy and its impact on different professional roles (such as engineers, doctors, teachers), and accordingly develop AI-related educational policies, norms and guidelines for institutional use. All parties must have a clearer understanding of the impact of AI on higher education and actively participate in the design and development of AI educational tools to create solutions that meet the needs of teaching and learning.[9][10]

1.3 Future Vision of AI Integration in Higher Education

The impact of AI, particularly GenAI, on stakeholders such as teaching personnel, institutions, and enterprises depends on the prudent and ethical usage of technologies. As teaching personnel provide the irreplaceable human skills of embodiment, creativity and ethical reasoning, inspiring students, and cultivating multidimensional development, AI fails to replace the unique role of humans in education. This human-AI collaboration, with teaching personnel firmly at the centre of steering AI's development ethically, can amplify the best of both. In addition, effective integration of AI into higher education will amplify the outcomes towards SDG4. Specifically, with proper oversight and governance, AI can help enhance talent cultivation mechanisms, support teaching innovation, and promote institutional management innovation. Therefore, UNESCO-ICHEI holds an optimistic attitude towards the positive development of AI in higher education or AI in collaboration with teaching personnel, envisioning the following aspirations.

1.3.1 AI Enhances Talent Cultivation Mechanisms

In the process of integrating AI into higher education, the talent cultivation mechanism for teaching personnel and students is an indispensable aspect. AI can assess students' classroom performance and learning behaviours to help them create personalised learning plans, thus maximising the principle of "teaching students in accordance with their aptitude" and fostering their ability to learn independently. Teaching personnel need to receive specialised training to understand the potential and limitations of AI systems and develop the necessary competencies to integrate them effectively into their teaching. A human-centered approach is essential for strengthening interpersonal collaboration and advancing more personalised, humanistic education for everyone.

This white paper focuses on the development of various competencies of educators and learners in the talent cultivation mechanism, with key areas including [11][12]

Technical competency: Learners need hands-on training to become adept at using AI technologies. They must understand how different systems work, their features and functionalities, and how to troubleshoot common issues. Hands-on workshops, in-depth manuals, and technical support can help teaching personnel build technical fluency.

Ethical competency: Learners must recognise the biases and limitations of AI systems, and understand appropriate vs inappropriate usage. Training should promote algorithmic awareness, critical thinking, and responsible oversight. Teaching personnel needs guidance on fostering safe, ethical learning environments despite AI's imperfections.

Assessment competency: Learners require training to assess learning alongside AI systems effectively. This includes understanding the data AI tools collect, interpreting algorithmic recommendations, recognising limitations of automated assessments, and providing holistic human feedback.

Co-learning mindset: Rather than fearing replacement, learners should be encouraged to adopt a co-learning mindset with AI as a collaborative partner. With continuous learning and adaptation, teaching personnel can remain responsive to innovations. A growth mindset focused on complementing each other's strengths is critical.

1.3.2 AI Supports Teaching Innovation and "AI + Teaching Personnel" Model

Certainly, HEIs and educators can not avoid AI integration in various forms in the education sector. From an optimistic perspective, AI holds the potential to assist teaching personnel in all aspects of teaching to transcend traditional teaching modes. Under ethical and appropriate contexts, the positive interaction between AI and teaching personnel in teaching mutually supports educational innovation in the following ways:

AI as an Educational Collaborator: As an assistant, AI can handle routine tasks, allowing teaching personnel to focus on curriculum development and other more creative work. Under the supervision of teaching personnel, AI can assist in classroom explanations, guided discussions, task assignments, and suggestions and feedback based on teaching objectives.

AI as an Assessment and Analysis Engine: By continuously evaluating teacher–student interactions and teaching effectiveness, AI can generate visualized data and analyses on knowledge gaps and participation. This enables teaching personnel to make targeted teaching decisions and scientific decisions based on data.

AI as a Co-Creator of Personalized Teaching Content: AI algorithms can summarize teaching materials, generate exercises, provide explanations, and offer personalized and customized teaching plans based on the analysis of learning resources.

AI as a Designer of Teaching Scenarios: AI can assist teaching personnel in designing highly attractive simulated environments, and creating personalised and adaptable teaching experiences that promote active learning through diverse scenarios and interactions.

AI as a Teacher Development Coach: Personalized AI coaching can provide teaching personnel with feedback on their teaching practices, lesson plans, and ito monitor financial management betterinteractions, helping them master new skills through reflection and practice.

AI as an Administrative Assistant: Handling daily administrative tasks such as organizing course materials and basic grading, AI assistants can simplify workflows, allowing teaching personnel to focus on high-quality teaching.

1.3.3 AI Assists Institutional Management Innovation

Regarding AI integration in higher education, AI not only stimulates talent cultivation and pedagogies but also innovates institutional management models. With its powerful cloud-based data storage capabilities, AI can rapidly analyse massive data sets, aiding institutional administrators in making scientific decisions.

Virtual Assistant: AI virtual assistant and automated processes can enhance institutional management efficiency. Automating routine tasks saves administrators more time for strategic planning and policy formulation. Virtual assistants can also provide timely support for students and staff, gather demands and feedback on administrative services, and improve the quality of campus services.

Optimising Admissions and Academic Assessments: AI has tremendous potential in institutional admissions. It can analyse students' academic backgrounds and characteristics, helping administrators to understand students more effectively and offer suggestions for recruitment strategies. AI can also assess the academic performance of enrolled students, track long-term changes in their academic achievement, and help HEIs improve teaching quality.

Financial Management: AI can assist HEIs in planning financial budgets, identifying potential ways to reduce costs, and optimising resource allocation. AI systems can also enhance financial transparency, enabling administrators to better monitor financial management.

Improving Research Incentive Models: AI can help HEIs better manage and utilise intellectual assets, adjust research incentive models, and promote research and innovation. AI can also break down disciplinary barriers, foster interdisciplinary collaboration, and contribute to curriculum reform.

1.3.4 Co-Creating a New Ecosystem of AI Integration in Higher Education

To realise the effective integration of AI into higher education, all stakeholders must jointly shape a supportive new ecosystem that enables teaching personnel to use AI effectively. This requires common action from governments and policymakers, HEIs, and enterprises to create conditions for empowering higher education with AI.

Governments and policymakers have a vital role to play in driving the integration of AI with higher education. They need to fund high-quality teaching personnel training programs and set competency standards for educators to deploy AI effectively and ethically. Policies must delineate appropriate versus inappropriate uses of AI to safeguard students. Supporting rigorous research on AI's impacts and teacher effectiveness is critical for evidence-based practice and policy. Governments must make concerted efforts to bridge digital divides, and one possible approach is promoting partnerships between industry and educational institutions, ensuring that even rural and remote areas have access to AI platforms and capacity-building resources. Monitoring policy impacts on educational equity will be crucial. Policymakers should foster dialogues and convene experts across disciplines to develop guidance and governance frameworks that uphold ethical values. Through multi-sector collaboration and system-wide strategy, governments can lead in steering AI's potential to benefit all learners equitably rather than further disadvantages.

Higher education institutions (HEIs) are also crucial in driving the effective integration of AI into higher education. Education leaders must prioritise upskilling teaching personnel on effective, ethical applications of AI by implementing comprehensive training programmes, Communities of Practices, mentorship programmes and self-directed learning resources. Instructional design teams can develop content that equips teaching personnel with technical fluency in AI systems, pedagogical integration strategies, ethical considerations, and assessment strategies in AI-enhanced teaching and learning. Ongoing professional development through workshops, certifications, and micro-credentials will enable continuous adoption of emerging best practices. Institutions can foster peer mentoring and collaboration by building professional learning communities focused on classroom AI implementation. Tenure and promotion policies could incentivise teaching personnel to publish action research on AI applications. IT departments need to ensure robust infrastructure, user support and monitoring to actualise good use of AI tools on campus.

EdTech enterprises are a critical link in the new ecosystem. Enterprises can carry out AI pilot projects, providing resources and technology for educational innovation and applying advanced AI systems in higher education. Specifically, by developing AI educational software and products, such as intelligent teaching management systems, chatbots, virtual tutors, and personalised learning platforms, enterprises can enhance the teaching experience and improve institutional management efficiency. They can also offer data analysis solutions to help institutions collect and analyse teaching management data and propose targeted improvements. Furthermore, enterprises can leverage industry advantages to collaborate with HEIs and research institutions, sharing technology and resources.

Teaching personnel in HEIs, as essential members in education, play a role in implementing, evaluating, advising, and negotiating in the co-creation of the AI integration ecosystem in higher education. To effectively apply AI technology, teaching personnel in HEIs should collaborate with industries to identify needs and co-design solutions related to teaching issues. This collaboration is crucial for AI products to empower education.

Strong partnerships are essential for a new higher education ecosystem. The AI industry and private sector need to collaborate with governments and HEIs to co-develop responsible practices and align with governance frameworks. All stakeholders should closely collaborate to advance policy advocacy and best practices and align with the vision of effective integration of AI into higher education, jointly shaping a thriving ecosystem.

1.3.5 Vision and Commitment of UNESCO-ICHEI

UNESCO-ICHEI, in collaboration with global partners, will promote the effective AI integration in higher education, unlock the potential of AI to empower educators, innovate higher education models, and organically integrate teaching personnel's competencies into AI technology. It will deepen the strategic capacity building of HEIs in the AI era, from policy guidance and professional development to technical support, ensuring the quality, equity, and lifelong learning opportunities of education.

Enhancing Teaching Personnel Professional Competencies and Literacy in Applying AI

As UNESCO-ICHEI's flagship project, the International Institute of Online Education (IIOE), has been committed to helping teaching personnel in developing countries improve their online and blended teaching abilities. In the future, IIOE will integrate AI technology in its course system to enhance the AI competence of teaching personnel.

Improving Talent Cultivation Mechanisms

UNESCO-ICHEI calls on partner institutions to formulate long-term talent development strategies, empowering teaching personnel through optimisation and upgrades of AI technology. Adhering to a human-centered approach, it will leverage the advantages of AI technology to provide personalised solutions for teaching personnel and students. IIOE will use micro-certification, among other means, to assess teaching personnel's use of AI tools and provide appropriate recommendations and feedback.

Promoting Teaching Innovation

IIOE will integrate various roles of AI in teaching, improve the efficiency of teaching personnel in handling routine tasks, unleash their creativity in curriculum development and design, enrich personalised teaching scenarios, innovate teaching methods, and enhance the quality and effectiveness of teaching.

Advancing Institutional Management Innovation

IIOE will offer a series of courses on AI innovation in institutional management, helping administrators upgrade their traditional methods, improve management efficiency, and make informed decisions in recruitment, resource allocation, and budget planning based on big data analysis.

Strengthening Partnerships and Ecosystem Construction

IIOE will mobilise global partner resources through a network of flagship HEIs worldwide, strengthen public-private partnerships and the collaboration between industry and education, and jointly build an ecosystem for the integration of AI into higher education.

Promoting the optimisation and upgrading of AI education products

IIOE works with the AI industry to explore emerging technologies such as AI, AR/VR and big data, as well as cooperates with HEIs and governments, to promote quality resources and AI tools for higher education.

Strengthening the UNESCO system's governance capacity for global higher education

HEIs and teaching personnel in developing countries should showcase their leadership in education transformation. In the future, the IIOE National Centers will expand the scale and ripple effect of the integration of AI in higher education, help teaching personnel to obtain sustainable professional development in the AI era, and strengthen UNESCO's governance capacity for global higher education.

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Chapter 2:

Enterprise Partnership in Facilitating AI Integration in Higher Education

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As mentioned in Chapter One, the response in the education sector is typically cautious whenever there is a surge in technological waves. Since 2016, a new generation of AI technologies represented by machine learning, especially deep learning, has been continuously advancing towards more advanced, complex, and autonomous directions. This trend has become even more pronounced since the release of ChatGPT at the end of 2022. Technological breakthroughs have brought transformative opportunities to economic and social development. The explosive growth of AI applications and the increasingly diverse ecosystem are permeating into all walks of life. The AI market continues to grow exponentially, and these investments gradually extend from enterprises to higher education. According to a survey conducted by Helper Systems in 2023 targeting IT professionals and librarians in higher education [1], 37% of enterprises are strategically positioning themselves to provide AI products to HEIs. In its predictions for future employment trends, McKinsey also pointed out that "by 2030, at least 30% of working hours in the United States will be automated by AI" [2]. **The Future of Jobs Report 2023** released by the World Economics Forum (WEF) , indicates that the job market expects an increase in efficiency through AI for 44% of

positions [3]. This undoubtedly places demands on talent development in higher education.

The close integration of higher education with the cultivation of future talents, the cultivation of talents that meet enterprise needs, and an overview of the enterprise's investment in talent development are crucial. It is essential to consider how to promote AI integration in education. Currently, enterprise-education partnerships in the field of AI and education mainly focus on cultivating talents in high-demand enterprises, building smart campuses, and AI-assisted teaching. The enterprises had already gained some experience at scale in these fields, enabling them to assist HEIs in realizing the vision of AI integration.

Therefore, based on the diverse partnership characteristics of IIOE and its own vision, understanding the updates and arrangement of enterprises in higher education and contemplating how IIOE can leverage the results of enterprise-education partnerships to drive innovation in higher education is strategically necessary. Institutions must achieve their future vision and seize development opportunities through the enterprise's scale and first-mover advantages.

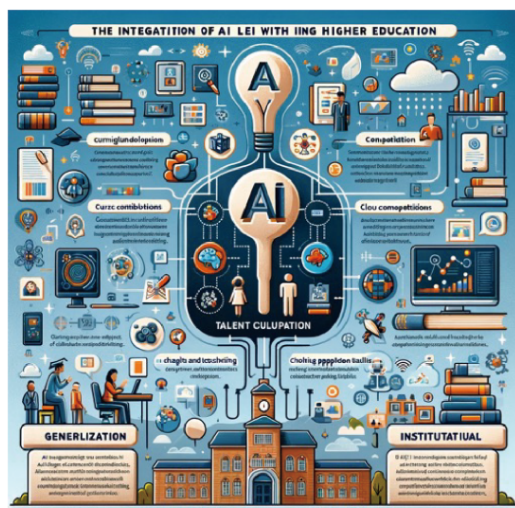
2.1 Enterprise-Higher Education Partnership Approaches

In the educational landscape, the integration of AI offers a rich imaginative space, supporting reforms in teaching, talent development, and management at various levels.

Enterprises, such as Microsoft, Google, and Huawei, actively collaborate and provide technological support to HEIs, ensuring HEIs maintain a leading technological position, guarantee educational quality, and give the students world-leading academic resources. For example, Microsoft organizes global virtual challenges to encourage students to rethink the future of education while providing access to tools like Azure AI. Google supports educational institutions in device management and technological applications to ensure the effectiveness of the educational process. Huawei collaborates with HEIs to accelerate digitization and train students, and promote innovative educational models to enhance education quality. Additionally, in collaboration with the U.S. Department of Education, IBM has developed a document named "**Opportunities for Digital Transformation in Education**" which explores an intelligent education maturity assessment model for the first time.

At the instructional level, learning management systems, such as Zapiet and Khan Academy, assist teaching personnel and institutions in effectively managing learning progress and content. They facilitate cognitive development by connecting knowledge and creating knowledge graphs. Tools like SmartGrade and Formative aid teaching personnel in diagnosing student achievements, and improving teaching efficiency. Turnitin, Winston AI, CopyLeaks, and similar tools help institutions and teaching personnel evaluate student assignments' originality, knowledge, and accuracy.

In addition to the tools mentioned above, a myriad of AI image and video generators provide convenient means for creating teaching materials. HEIs urgently need to shift their perception and consider how to design new ways of learning and evaluation in light of these advancements.



A conceptual diagram illustrating the integration of AI with HEIs generated by DALL-E

In summary, enterprises need to actively participate in the innovation process of teaching materials and curriculum.

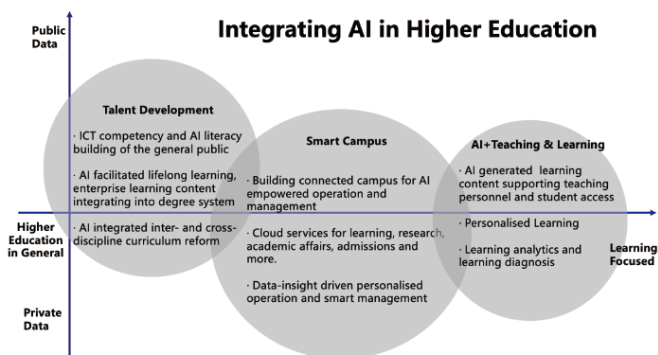
From the perspective of the demand for talent development in higher education, enterprises are supporting HEIs in offering AI-related courses. This includes establishing specialized courses covering machine learning, data science, computer vision, etc., to equip students with professional knowledge and skills in AI. Interdisciplinary course designs are essential to address future work scenarios and the specific integration of AI into life and work. This involves combining AI with other disciplines, such as AI and medicine, AI and law, AI and economics, providing students with diverse learning perspectives.

HEIs should also collaborate with enterprises in joint research and development projects. This collaboration involves conducting scientific research and technology development in partnership with the AI enterprise, promoting the integration of theory and practice. Establishing incubation centers and laboratories that provide research resources and environments encourages innovation and experimentation. Enterprises such as Google, Baidu, Intel, and OS-EASY actively participate in constructing and transforming institutional curriculum systems, offering course resources or professional certifications for credit or non-credit courses to students and faculty.

From the perspective of smart campuses and institutional management, leveraging capabilities in network communication infrastructure, teaching, and campus IoT construction, campus data cloud services, and big data platform services is crucial. Creating a connected and intelligent institution based on cloud technology and data insights, AI can support daily teaching, departmental research, institutional management, and campus services, improving overall efficiency in management and establishing an integrated, innovative, efficient, secure, and humanistic smart campus. Giant enterprises like Verizon, Amazon Web Services (AWS), Huawei, Microsoft, Alibaba Cloud, and others actively cooperate with HEIs to upgrade infrastructure, enhance campus computing capabilities, integrate data insights, and promote integrated intelligent management.

From the perspective of instruction, providing appropriate internship and career development opportunities is a vital requirement for talent development. Initiating enterprise-higher education partnership internship programs in collaboration with AI companies provides students with practical opportunities to learn and apply AI skills in real work environments. Furthermore, technology application and teaching reforms are urgently needed. AI-assisted teaching and the use of AI tools to improve teaching methods, such as personalized learning path design and automated grading systems, address issues related to teaching personnel shortages or uneven distribution of educational resources. Additionally, the continued development and consolidation of online and blended learning, combined with AI technology, can enhance the accessibility and flexibility of education. Enterprises focusing on this area tend to be relatively small, primarily focusing on education technology or AI-generated content (AIGC) products. For example, Canva helps educators create PPTs and images suitable for educational scenarios, Claude assists learners in extracting key information from articles, and software like Grammarly, DeepL, and NetEase Youdao aids learners and teaching personnel in intelligent translation and language optimization. Enterprises such as Plaso's Infi focus on enhancing teaching personnel efficiency in organizing teaching outlines through electronic canvases and mind maps. At the same time, NOLEJ concentrates on generating interactive teaching videos, quizzes, and flashcards. Traditional textbook and digital textbook enterprises like LamMo, Pearson, Kaplan are also integrating GenAI technology to assist in improving the efficiency of interactive learning and cognition in educational materials.

Since its establishment in December 2019, IIOE has adhered to a collaborative mechanism and principle of "Extensive Consultation, Joint Contribution and Shared Benefits" in collaboration with enterprises and HEIs. Leveraging the technological advantages in the ICT sector, IIOE actively promotes collaborative initiatives and mutually beneficial partnerships between businesses and HEIs across various enterprises. In the current landscape of AI and education, enterprises are increasingly recognizing the importance of investing in education for their long-term development. They actively shoulder educational responsibilities, proactively participate in collaborative educational systems, and foster a novel corporate culture that integrates enterprises and HEIs. Facing the challenge of how higher education can integrate with AI, HEIs need a comprehensive understanding of how the enterprise can bring opportunities for educational enhancement to make informed decisions. IIOE attempts to comprehensively summarize, based on the inherent characteristics of HEIs and the segmented areas of products, solutions, and services provided by enterprises, categorizing the primary applications into three major scenarios: talent development, smart campuses, and AI-enhanced teaching management. Additionally, IIOE endeavors to classify the data support requirements for different scenarios.



Notably, from the perspective of data utilization, the inevitable use of private data (whether personal or organizational) is required for AI to meet the needs of educational institutions, learners, and teaching personnel. From an ethical and social responsibility standpoint, higher education and enterprises must collaborate to establish universal AI ethics and social responsibility education. This education aims to assist educational institutions, teaching personnel, and learners in understanding and addressing the ethical challenges posed by AI technology, such as issues related to privacy protection, bias, and discrimination. Furthermore, there is a need to actively engage in research on the social impact of AI technology to comprehend its effects on society, the economy, and culture. This initiative aims to promote public understanding and discernment of AI technology.

Enterprises' Initiatives in AI + Higher Education



Huawei

Huawei's investment in enterprise-education partnerships in the education sector is primarily manifested through the Huawei ICT Academy project, which focuses on ICT talent development. It incorporates Huawei Cloud's Smart Campus solution and the Pangu Language Large Model, which provides GenAI services for various enterprises. In the field of education, the Pangu LLM offers personalized learning experiences and tutoring for students. The Huawei ICT Academy reaches globally to convey Huawei's ICT technology and product knowledge to university students, encouraging them to participate in Huawei Career Certifications. This initiative contributes to the global cultivation of innovative and applied technical talents for both society and the ICT enterprise chain.



Microsoft

As a company deeply engaged in collaboration with OpenAI, Microsoft has incorporated AI technologies, including GenAI, into aspects of institutional management, teaching support, and talent development. The iSchool at Syracuse University collaborates with Our Ability to help students create AI-driven job interfaces for people with disabilities. In empowering teaching personnel, Microsoft's education sector offers various tools, digital teaching methods, and software development services, comprehensively supporting HEIs, teaching personnel, and learners. Microsoft has also made commitments on its official website, making significant progress from ensuring student data security to inviting educators to conduct joint educational research, ensuring data fairness and transparency, and applying AI technology to promote educational equity.



Baidu

Baidu Corporation primarily focuses on supporting HEIs in cultivating a new generation of AI professionals in the rapidly developing field of AI. Through the "Baidu's AI Talent Development Program: Empowering Five Million AI Talents with Universities", Baidu is forging enterprise-higher education partnerships to transform university students, particularly those engaged in computer science and related interdisciplinary fields, into adaptable AI experts. Currently, in China, Baidu is partnering with prestigious institutions such as Shanghai Jiao Tong University, Tongji University, Jinan University, and Wuhan University. This collaboration brings together peers interested in AI technology for collective learning, bridging the gap between enterprise and higher education. It assists students in enhancing their competitiveness as they prepare to enter their professional careers. Baidu's alliance with HEIs is dedicated to nurturing the next generation of AI talents, catalyzing the rapid advancement of AI technology, strengthening the synergy between academia and enterprise, and paving the way for a future marked by AI-driven innovation.



Google

Google has established a comprehensive learning system and micro-certificate courses to help more people understand and acquire general knowledge and development skills in the field of AI. The PaLM API Large Language Model (LLM) in its platform provides an open environment for teaching personnel in HEIs and learners to experiment and independently develop. Through collaboration with the Oxford Internet Institute, "The A-Z of AI" page provides rich insights to help the general public understand AI, especially General AI, and its impact on various aspects such as business, enterprise, environment, and education. The developed "A Guide to AI in Education" provides teaching personnel and institutions with a quick guide to deploying AI in teaching. Regarding ethical commitment, Google has issued its statement, ensuring privacy security and actively inviting educators to participate in development dialogues related to their products.



OS-EASY

OS-EASY AI focuses on promoting the integration of AI with higher education, particularly in supporting teaching, practical training, and teaching administration. Through collaborations with international HEIs, they have developed AI and cloud computing courses. Training programs are designed to enhance the technical management skills of administrators. Leveraging cloud computing technology, they cover the entire range of desktop needs in various enterprises. Additionally, they utilize the micro-certification system to improve the evaluation of training courses, advancing the recognition of certification for training outcomes through exams and competitions. The company is actively co-establishing AI labs and experimental centers, experimenting with blended teaching models based on their core technologies, such as the OEIDP desktop transmission protocol and multi-architecture integrated desktop cloud. These efforts aim to assist HEIs in constructing digital and ubiquitous AI experimental teaching modes.



Intel

In 2021, Intel launched the "Intel Digital Readiness" Program globally to promote emerging technologies and inject new energy into digital education and digitization of education. In the U.S., Intel initiated the "AI for Workforce" program in collaboration with Dell and the American Association of Community Colleges, establishing AI labs in 15 community colleges nationwide, and providing free AI tools and courses for faculty and students. In China, Intel deepened cooperation with the Ministry of Education of the People's Republic of China, enhancing teaching personnel's and learners' capabilities in technological innovation, cultivating high-quality technical talent, and supporting a range of education projects and activities to expand teaching personnel's instructional perspectives and digital skills.



Canva

Canva is an online collaborative design platform widely used by educators to create digital teaching materials such as presentations and posters. Recently, Canva introduced a set of AI tools called "Classroom Magic" to assist educators in various tasks, including course planning, content editing, document reformatting, image and text editing, multilingual course support, and accessibility checks. These tools aim to help time-constrained educators create engaging and visually appealing content for their students. Canva for Education is a free platform that integrates with core classroom tools such as Schoology, D2L, Moodle, Blackboard, Google Classroom, Canvas, and Microsoft Teams. Canva for Education allows teaching personnel to connect their work to the Learning Management System (LMS) and create captivating assignments.



MOSOINK

MOSOINK, an EdTech company, integrated Large Language Models (LLM) and GenAI technology into creating online digital educational materials in 2023. The AI version of the cloud textbook editor used by teaching personnel includes features such as intelligent assistance in writing and intelligent proofreading, significantly improving the efficiency and quality of teaching personnel's content creation. It also provides an intelligent means for educational institutions and publishers to ensure the quality of cloud textbooks. From a technical and platform connectivity perspective, MOSOINK Cloud, as the drafting unit, has guided the revision of China's "Digital Textbook Platform Interface Standard," ensuring seamless technology integration into existing university systems with data accessibility and universality.



Plaso

Plaso's Infi is a visual collaboration space developed using AI technology. It provides a collaborative canvas integrated with AI for teaching personnel and students. Infi incorporates AI technologies such as natural language processing and deep learning to understand and generate information such as text and images. It offers AI-generated applications, including interactive Q&A, summarization, translation, mind map creation, creative associations, and PPT generation. These AI applications become potent tools for efficient teaching, helping teaching personnel automatically generate course outlines, create teaching plans, and produce summaries and mind maps based on class content, enhancing training effectiveness and efficiency.

2.2 Issues and Challenges in AI Integration in Higher Education

The current enterprise vision is vigorously driving the advancement and transformation of AI technology. However, due to the profit-oriented nature of the enterprise, key performance indicators (KPIs) for corporate expansion may overlook the essence of education or introduce biases, symbolic issues, or localization oversights. While actively exploring the opportunities of integrating AI with higher education, it is essential to discern the limitations of technology, the potential risks it may pose, and its genuine impact on the substance of education. Maintaining a critical stance towards technology is crucial to ensure that educational objectives remain undistorted.

2.2.1 Universal Challenges

The gradual introduction of AI technologies, especially LLM, into the education industry, will profoundly impact traditional teaching and management models in educational institutions. While educational institutions actively embrace the transformative power of AI technologies, contemplating the opportunities and possibilities that AI support brings to instruction and institutional management, they must also consider corresponding risks and challenges, clarify the results and effects of AI technology use, and implement a series of responsive measures. AI-supported precision teaching may potentially misguide students' learning directions, and misinformation could lead to misunderstandings among learners. Simultaneously, integrating AI and education without proper planning will further challenge the digital divide, disrupting the fairness and accessibility of education, and causing workers in underdeveloped regions or lacking AI literacy to fall behind.

Data security and personal privacy protection have become unavoidable ethical and safety concerns driving the advancement of AI technology in education. Additionally, due to the nature of GenAI technologies like ChatGPT, which are based on machine learning, they have inherent limitations that require scientific evaluation and regulation during application. Overreliance on GenAI technologies may lead to adverse effects. For example, ChatGPT may exhibit biases in algorithms and data, potentially influencing teaching personnel and student decision-making. GenAI technologies may collect and store extensive personal information, including students' learning data and behavioral habits, raising privacy and security concerns[4]. The digitization transformation of higher education based on AI technologies has gradually become a global trend in the education sector. To address the challenges of integrating AI technologies into education, we must adopt a comprehensive approach, involving the establishment of ethical standards and moral guidelines, the design of integrated governance frameworks, the implementation of compliance monitoring mechanisms, and the enhancement of the formulation and enforcement of legal regulations, coupled with collaborative technological strategies.

On a broader scale, enterprise-education partnerships lack clear regulations at the national level in most countries. The absence of specific and actionable laws and implementation details, coupled with vague provisions regarding the responsibilities, rights, and interests between enterprises and educational institutions, has left enterprise-education partnerships in a relatively loose state. This ambiguity has also impacted the integration of AI technology into education within the industry, emphasizing the need for governmental intervention in the top-level design of legal frameworks and regulations to drive enterprise-education partnerships further.

2.2.2 Algorithmic Interpretability and Privacy Protection

The rapid advancement of technology and the cautious approach to education have led decision-makers to express concerns about the interpretability of algorithms. Many AI systems, particularly those based on deep learning models, operate as a "black box" in their decision-making processes, making it challenging for educational institutions and teaching personnel to comprehend how AI arrives at specific predictions or recommendations. This lack of transparency results in diminished trust and acceptance of AI technologies in areas such as student performance evaluation or personalized learning suggestions. Additionally, when stakeholders cannot understand the workings of algorithmic decisions, they may approach the outputs skeptically, fearing the risks associated with incorrect choices. Identifying and rectifying errors promptly may become challenging if the algorithm makes errors or unreasonable decisions. Moreover, ethical and accountability issues arise in educational institutions concerning AI-driven decisions, such as grading and admission choices. If the algorithm is opaque, determining responsibility and explaining the logic behind decisions becomes challenging.

From the perspective of privacy protection concerns, AI systems often require substantial data for training and operation, including sensitive information such as students' personal details, learning behaviors, and academic records. How enterprises collect, store, and use this data raises significant privacy concerns. When data leaks and misuse are risks, how should enterprises and higher education institutions delineate responsibilities? Does enterprise intervention lead to excessive monitoring of learners and teaching activities, jeopardizing students' autonomy and agency? Additionally, different countries and regions have varying laws and regulations regarding the privacy protection of educational data. Educational institutions using AI need a clear understanding of how enterprises ensure compliance with these legal provisions. These concerns contribute to educational institutions approaching enterprise collaborations with caution.

2.2.3 Empowering HEIs and Teaching Personnel

How to guide educators in integrating AI into daily teaching practices, enhancing teaching efficiency, and implementing precision assessment has become an urgent demand on an international scale. With a surge of emerging technologies, from an industry perspective, private enterprises mainly provide support in enhancing technological capabilities. However, the burden of using AI to assist teaching, helping teaching personnel master AI literacy and ethical competence, and developing suitable tools based on teaching personnel's needs still rests on educators and institutions. Educators have already undertaken a heavy teaching workload, and enterprises should actively participate more in the teaching process. To avoid reinforcing technological biases, enterprises should assist educators and institutions in providing appropriate ethical skills, assessment capabilities, and co-design skills. The sustainability and universality of capacity building should also focus on ensuring that teaching personnel and institutions receive accurate, high-quality, and timely training. Specific issues that need urgent attention include:

Technological Competency:

Educational institutions and teaching personnel need the technological competency to apply, deploy, and support AI technologies and solutions, and enterprises should take on a more proactive role.

Monitoring and Evaluation Competency:

Enterprises and AI technology development departments should assist institutions and educators in obtaining monitoring competency, ensuring that procured or used AI technologies can be objectively evaluated. If risks arise, timely cessation and withdrawal should be possible.

Awareness and Understanding Competency:

Given the emergent nature of AI technology, enterprises should actively engage in dialogue with stakeholders in higher education. By collaborating with institutions and educators, they should clarify the AI content generation process and potential biases or prejudices brought about by the technology, ensure that educational institutions are aware of the corresponding impacts and understand the process of technological-induced changes.

2.3 Building a Mechanism for the Good Use of AI for Higher Education

To harness the power of the enterprise and facilitate the upgrading of competencies in applying AI technology to education, it is essential for the enterprise to actively engage in dialogues, negotiations, and the formulation of principles. The "AI for Good" initiative led by the International Telecommunication Union (ITU) stands out as an international effort advocating that technology should benefit humanity. In the process of integrating higher education with AI, stakeholders should demonstrate a mutually beneficial relationship, shaping such enterprise-education partnership into a mechanism of "common good." Simultaneously, there is an emphasis on the "good governance" of AI technology, ensuring effective responsibility management [4]. At the enterprise and industry levels, we propose the following recommendations to promote the application of AI and mitigate associated risks:



"AI for Good"
Source: ITU

Establish A Common Vision

Industries and HEIs should foster consensus regarding the role of AI technology in both educational and industrial contexts. This entails comprehending the industry's demand for AI skills and knowledge, as well as recognising the potential of higher education in meeting these requisites. Only through shared goals and respective strengths can a more coordinated development be realised.

Transparency and Explainability

Enterprises and industries serve as providers of AI services, while most HEIs have not made explicit statements about fully integrating AI technology into institutional settings. One of the reasons for this hesitancy is the concern about the transparency of mechanisms regarding how AI technology handles data and makes predictions. According to the Tencent Research Institute's *Development Report on Explainable AI* [5], not all AI systems are "black box" algorithms, and AI systems are not inherently more incomprehensible than traditional software or human-made programs. In the future, the continued progress of AI is expected to bring about autonomous systems with self-perception, learning, decision-making, and action. However, the practical utilisation of these systems is limited by whether machines can adequately explain their thoughts and actions to human users. If users want to understand, trust, and effectively manage the new generation of AI partners, the transparency and explainability of AI systems are crucial. Therefore, the enterprise needs to provide

Explainable Artificial Intelligence (XAI) to help various higher education stakeholders understand the technology's transparency and undertake the task of explanation.

Voluntary Commitment

In some countries and corporate contexts, a new direction has emerged concerning responsible AI governance—a concept known as "Corporate Digital Responsibility (CDR)". According to a recent interpretation by PricewaterhouseCoopers, CDR is a form of voluntary commitment designed to guide organizations in adopting "good" digital business practices and digital sustainability in the digital society. It particularly focuses on the social, economic, and ecological impacts of data and algorithms [6]. In the integration of AI and higher education, more enterprises need to voluntarily commit and engage in providing AI technologies for the common good of educational integration. This aligns with the consensus of various stakeholders in higher education.

Establishing Sandboxes

The initiative proposed during the 2023 UNESCO "Digital Learning Week" to help remote areas access and experiment with AI technology through the provision of "sandboxes" is a direction where enterprises can make efforts. Harvard University and Stanford University are currently collaborating with enterprises to establish online experimental spaces [7] [8], providing a testing ground for AI integration in education. This offers teaching personnel and institutions a space and platform to understand, experiment, and efficiently apply AI.

Empowering Teaching Personnel and Institutions

Enterprises should invest in the field of education by engaging in meaningful dialogues with public institutions, teaching personnel, and educational institutions. By responding to the practical needs of institutions and teaching personnel, and understanding the requirements of various stakeholders, enterprises can help them comprehend the impact and expected outcomes of AI technology. This collaboration ensures a responsible and mutually beneficial enterprise–education partnership.

Establishing Universal AI Literacy Training

This aims to provide foundational knowledge and skills about AI to a broad audience. The significance of such training lies in enhancing public understanding of AI technology, enabling them to adapt better, use, and critically think about AI technology in an increasingly digitized world. This includes popularizing basic knowledge, cultivating practical skills, conducting discussions on ethical and societal impact issues, and continuously reviewing and updating related training content.

Continuous Assessment and Optimization

Enterprises should engage in dialogues and mechanisms for negotiation with various stakeholders in higher education. They should actively participate in the regular assessment of collaboration effectiveness, issue identification, and continuous optimization processes. This two-way input and mutually beneficial collaboration between industry and higher education can only be achieved through such mechanisms, ensuring stable, effective, and long-term positive development.

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03

Chapter 3

AI and Higher Education: Policy and Governance

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With the development and wide application of AI technology, international organizations, governments and HEIs have gradually realized that to guide and regulate the development and application of AI in higher education, it is necessary to formulate corresponding policies and regulations. This is essential for achieving a deep integration of education and AI, promoting societal progress, and cultivating talents. In October 2023, UN Secretary-General Antonio Guterres announced the establishment of the Advisory Body on Artificial Intelligence, and on December 22, the advisory body released its Interim Report: **Govern-**

ing Artificial Intelligence for Humanity, highlighting the need for policy discussion and joint governance within a coherent framework.

Chapter 3 will enumerate, compare, and summarize the policy measures of international organizations, governments, and HEIs in promoting the integration of AI with higher education. Building upon this foundation, this chapter will put forth recommendations to support the practical introduction, management, and governance of AI technologies in higher education.

3.1 Promoting AI Integration in Higher Education: International Organizations in Action

The technological emergence of AI poses the risk of intensifying the challenges of educational equity and has radically changed teaching and learning today. GenAI brings development opportunities to the education sector, opening up a new pattern of digital transformation in education, innovating new multi-modal learning experiences, and empowering human-computer collaboration in learning intelligence. Despite its potential, some risks are still associated with applying GenAI in higher education. Therefore, HEIs need to comprehend the genuine impact of AI on education, avoiding herd instinct and educational anxiety caused by "the anxiety of technological upgrading" and effectively guiding the integration and application of new technologies in higher education [1].

International guidelines and policies on AI in higher education, especially GenAI in higher education, focus on regulating the use of GenAI in higher education teaching, learning, and research activities (AI for Education), as well as on encouraging HEIs to build AI capacity and form partnerships with multi-stakeholders (Education for AI) [2]. These are broad guidelines that mostly seek to inform global, regional, and national policymaking, as well as to call for collaborations.

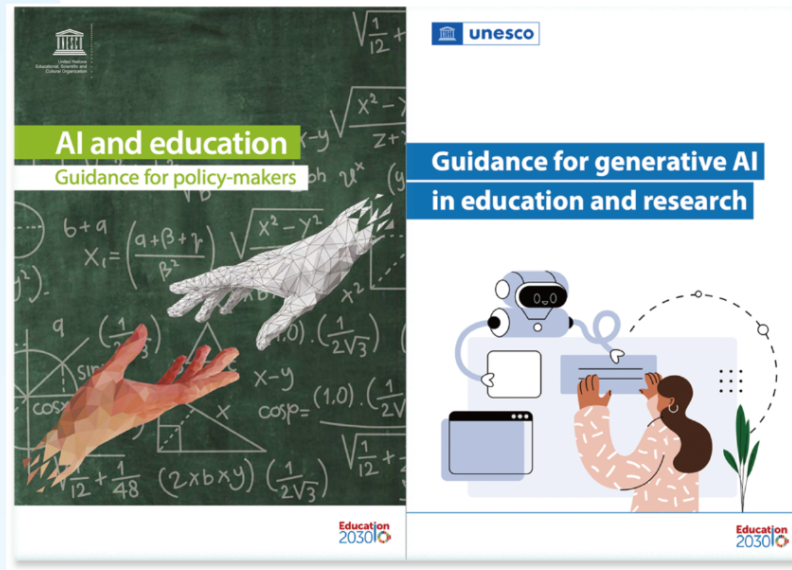
3.1.1 UNESCO Leads International Initiatives

UNESCO released the "*Beijing Consensus*" in 2019, which proposes that countries should lead the implementation of appropriate policy response strategies to innovate education through the systematic integration of AI and education, accelerate the building of open and flexible education systems, and ensure lifelong learning opportunities that are equitable, suitable for everyone, and of good quality for all, so as to promote the achievement of the SDGs and a community with a shared future for mankind [3].



Actions to be considered in Beijing Consensus on artificial intelligence and education

The "*AI and education: guidance for policy-makers*" released by UNESCO in 2021 emphasizes awareness of the multidisciplinary nature of AI and its impacts, and proposes the approaches of government engagement, cross-sectoral integration, and multi-stakeholder collaboration to planning and governing educational AI policies [4]. UNESCO's recent publication "*Guidance for Generative AI in Education and Research*" [5] provides step-by-step guidance for governments to implement near-term actions, plan long-term policies and develop human capacity to ensure a human-centered view of these new technologies. The guide also explores the potential for creative use of GenAI in curriculum design, teaching, learning and research activities.



Left: AI and education: guidance for policy-makers
 Right: Guidance for generative AI in education and research
 Source: UNESCO

In addition, UNESCO also advocates for the organization of capacity-building activities for policymakers and calls on global stakeholders to consider common global issues, such as how to ensure the ethical, inclusive, and equitable use of AI in education, how education can prepare humans to live and work with AI, and how AI can be applied to enhance education, etc.

In the field of higher education, the UNESCO International Institute for Higher Education in Latin America and the Caribbean (UNESCO IESALC) issued the *"Harnessing the era of artificial intelligence in higher education: a primer for higher education stakeholders"*, which highlights key points and decision directions that should be considered by all stakeholders at this time [6]. Its *"ChatGPT and Artificial Intelligence in Higher Education: Quick Start Guide"* aims to guide HEIs in initiating the use of ChatGPT and helps institutions identify the impact of AI on higher education [7].

3.1.2 Action by other International Organizations

The World Economic Forum (WEF) released *"The Presidio Recommendations on Responsible Generative AI"*, which focused on responsible development and release of GenAI, open innovation and international collaboration, and social progress [8]. The WEF urges educational bodies to increase AI literacy among the general public and encourages stakeholders to motivate public-private research collaboration and establish global AI governance.

The International Labour Organization (ILO), in a policy brief on GenAI and employment, points out that "GenAI has the potential to bring about shifts in task structures and occupational roles," which will impact teaching personnel and faculty in HEIs and learners preparing to enter the job market [9].

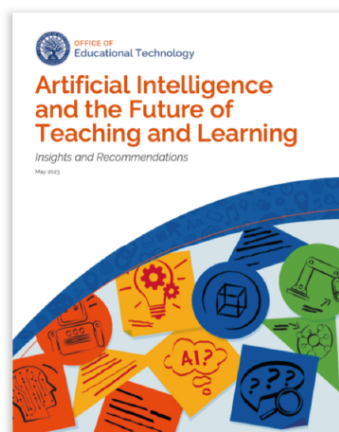
International organizations call on stakeholders worldwide to further examine the impact of AI in education and its appropriate application. At the global level, these organizations actively act to provide framework guidance on AI integration and governance in higher education for government departments and stakeholders. This aims to stimulate countries to recognize the urgency of formulating policies and norms for AI integration in higher education, promote enhanced cooperation globally, collectively address the opportunities and challenges in AI development, and foster the sustainable and healthy development of AI in higher education.

3.2 Efforts of Governments and HEIs to Promote the AI Integration in Education

The development of AI policies in higher education, especially GenAI policies in higher education, is mainly concentrated in developed countries and some developing countries, where the policies developed are more focused on AI technologies.

3.2.1 Government Departments Progressively Clarify Policy Directions

The U.S. Department of Education's Office of Educational Technology urges the development of AI policies, considering existing laws like the "Family Educational Rights and Privacy Act" (FERPA) and "Individuals with Disabilities Education Act (IDEA)". According to the "*Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations*", education-specific policies on AI are especially required to better address new challenges [10].



Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations

Source: U.S. Department of Education

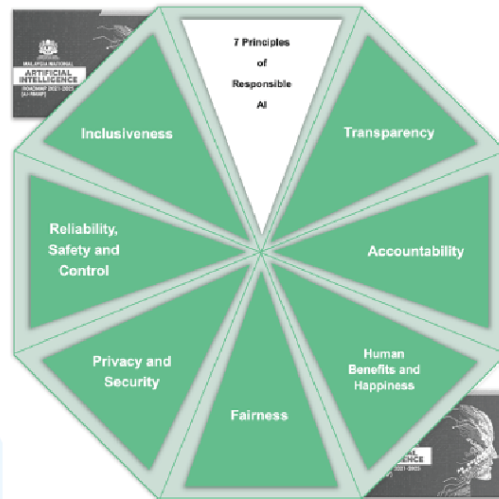
The UK government, through policy documents like "*Generative Artificial Intelligence (AI) in Education*", provides guidance for the responsible use of AI in institutions and HEIs. This guidance covers the protection of data, students, and staff, as well as a focus on intellectual property rights and data privacy. The UK Department of Education clarifies its stance on the use of AI models such as ChatGPT and Google Bard [11]. Additionally, UK HEIs have formulated principles guiding students and faculty in AI literacy, including support for AI literacy, responsible use of AI tools, adaptive teaching methods, academic integrity, and knowledge sharing, to keep pace with evolving AI practices [12].

The European Commission has issued the "*Ethical guidelines on the use of artificial intelligence and data in teaching and learning for educators*" in purpose of helping educators have a better understanding of the potential and risks of the use of AI in education [13].

In the Asia-Pacific region, China and Malaysia have also taken measures to promote the application of AI in higher education.

The "*New Generation Artificial Intelligence Development Plan*" in China explicitly outlines the use of AI technology to accelerate the transformation of talent cultivation models and reforms in teaching methods [14]. The "AI Innovation Action Plan for Institutions of Higher Education," introduced by the Chinese Ministry of Education, guides HEIs to enhance their capabilities in AI-related scientific and technological innovation, talent development, and international cooperation and exchanges [15]. China's "*Interim Measures for the Management of Generative Artificial Intelligence Services*" encourages the innovative application of GenAI technology in various industries and fields, including the education sector. It supports collaboration among industry organizations, enterprises, educational and research institutions, public cultural institutions, and relevant professional organizations in GenAI technology innovation, data resource construction, transformation application, risk prevention, and other aspects [16].

The Ministry of Higher Education in Malaysia is actively working on formulating guidelines related to tools such as ChatGPT. It explicitly states that it will not regulate these tools but will provide guidelines for their use [17].



7 principles of responsible AI in National Artificial Intelligence Roadmap 2021-2025 of Malaysia

In Africa, the AI policies related to higher education are currently relatively loose, especially in terms of guidance for the integration of AI technologies in higher education.



5 pillars for AI strategies in the Artificial Intelligence for Africa Blueprint

In Latin America, although AI policy development is still in its early stages, countries such as Brazil, Mexico, and Argentina are beginning to show interest in the intergration of GenAI in higher education. These nations are increasingly recognizing the potential of GenAI in enhancing educational standards and are actively exploring strategies to incorporate it into their academic frameworks.

The exploration of AI integration in higher education by various countries may bring about innovation and changes in the sector. However, many countries are still in the stage of discussing and exploring how to translate these goals into practical and context-specific policy regulations for their national contexts and HEIs. Therefore, more specific and actionable guidance and support can help countries and HEIs better formulate and implement policies related to the integration of AI with higher education, fostering collaborative efforts to better prepare global higher education for the challenges of the AI era.

3.2.2 Initiatives of HEIs to Facilitate the Integration of AI and Higher Education

Many HEIs have adopted interdisciplinary research and talent development strategies to facilitate the integration of AI and higher education. For example, the Institute of Data Science at the National University of Singapore and the Institute of Science and Technology for Humanity (NISTH) at the Nanyang Technological University promote disciplinary integration by establishing dedicated institutions, aiming to cultivate engineers with expertise in AI. The Mohammed V University in Morocco has established a major in AI engineering (2IA) and works closely with companies such as Apple, IBM, Huawei, and Microsoft in the talent training process to ensure that students get the opportunity to apply AI in practice [18]. China now has more than 200 HEIs that are qualified to build AI majors [19]. These policies and actions show that HEIs in various countries are actively developing measures to strengthen teaching and research related to the field of AI and cultivate high-quality talents.

At this stage, the main problems faced by various HEIs in the integration of AI and education are as follows [20]:

Curriculum design: How are the teaching objectives set? What content and skills should teaching personnel teach and students learn?

Student assessment: What kind of content and skills about AI have students mastered? What is the level of mastery of these content and skills? Are the content and skills relevant to future careers?

Teaching and Learning: How can HEIs instruct proper curriculum design and assessment? How can they foster digital literacy in teaching personnel to help them understand and embrace the potential of AI in education?

Research: What is the optimal way to develop, validate, and apply new knowledge? How can AI be effectively utilized to conduct and support research? Furthermore, how can guidance be provided to higher education researchers to ensure ethical and academic integrity in such studies?

Quality: How and under what circumstances is it appropriate to trust and adopt research findings and solutions provided by GenAI?

According to incomplete statistics, HEIs typically include the following elements when developing norms for AI integration into teaching and learning:

- 1. Attribution of responsibility:** Users of AI technology are usually responsible for the resulting lapses in academic rigor and integrity.
- 2. Encouragement of course design and evaluation:** HEIs encourage and support faculty to rethink the design of course objectives, assignments, exams, and other forms of assessment to be inclusive of the use of AI tools.
- 3. Focus on the auditability of AI tools:** When introducing AI technology, HEIs should be aware of the processes involved or plan to review the tools' use of data through a third-party company.
- 4. Co-design and alignment of goals:** Ensure that the goals of AI technology users and the institution, as well as the intended impact of technology, can be aligned through collaboration with the business.
- 5. Privacy Protection:** Institutions design privacy practices and support teaching personnel and students to take precautions during use.
- 6. Inclusiveness and equity:** Ensure that the use of AI tools promotes inclusiveness and that AI tools are accessible to all stakeholders.

HEIs are also increasingly making strategic explorations and targeted investments in GenAI, and these initiatives are affecting change in higher education. Many HEIs now have policies in place to regulate the use of GenAI by students and staff.

Attitudes towards AI adoption vary among HEIs across countries. Some HEIs tend to support the rational use of GenAI by students and faculty, and have developed specific policies and norms. For example, Harvard and Duke Universities as well as Stanford University in the United States, the Universities of Oxford and University of Cambridge in the United Kingdom, and the University of Guadalajara in Mexico have issued strict norms for the use of generative AI or similar AI technologies by faculty members and students, which cover important factors such as information security, data privacy, compliance, copyrights, and academic honesty, etc., and have been actively providing faculty members and students with guides on the reasonable use of AI tools, workshops, and other measures to promote the effective use of AI [21]. These universities believe that AI has the potential to innovate and accelerate research and development in the field of education, including the development of intelligent educational tools, the generation of personalized teaching content, and the discovery and transfer of knowledge in scientific research.

Meanwhile, some HEIs, such as Sciences Po in France and R.V. College of Engineering in Bangalore, India, have opted to take a cautious or even a banning stance on the use of GenAI [22]. In its ban, the Sciences Po states that students are not allowed to use ChatGPT or any other AI-based tool without explicitly stating a citation, for specific course purposes, and under the supervision of the course leader [23]. Sergei Guriev, provost, further explains the ban on behalf of Sciences Po: students are prohibited from using ChatGPT or any other AI-based tool in the production of written or oral evaluations [24].



The Rundown AI

The research found that HEIs present a diversity of attitudes and strategies in confronting GenAI and the integration of AI and education, which reflects the different understandings and perceptions and attempts of emerging technologies in national HEIs, as well as the need for a multilateral, multi-level dialogue to support all parties in reaching a common vision. In developing relevant policies, HEIs need to consider the potential value and risks of technology in a holistic manner to ensure the responsible use of AI in teaching and research, while advancing the development of the discipline and nurturing of talent. HEIs need to develop their own policies and guidelines as well as participate in the development of relevant policies at the national and even global levels.

There are a number of key actions that HEIs should take to promote the integration of AI into higher education:

Tailor and contextualize HEIs' own strengths and technologies to encourage faculty and staff to experiment with the use and integration of AI tools in their curricula, assessment and scholarship.

Refine policies for sharing with faculty, staff and students, and develop policies to encourage internal exploration of how GenAI can be utilized in a positive way.

Monitor this evolving trend – GenAI technology is in its early stages and is widely hyped, but the widespread use and exploration of GenAI models by students and faculty may challenge many traditional educational practices and assessment methods.

Explore Effective Use Cases – Evaluate potential educational uses that align with institutional strategies, particularly those that impact the areas of curriculum management and academic administration. Understand potential opportunities and challenges and discuss long-term strategic responses.

Acknowledging that faculty and students will continue to transcend the controlled and restrictive use of AI, moving towards exploring the most effective practices utilizing both human input and machine output. Monitor and track this as markets and technologies rapidly evolve, exploring how AI can help improve educational research and practices.

HEIs should adjust teaching and assessment methods to promote the ethical and equitable application of AI.

HEIs should ensure academic integrity.

Case Study: AI into Curriculum Reform: University of Florida, USA

The University of Florida is promoting the "AI Across the Curriculum" initiative to integrate AI into all disciplines and make it a core competency for all students. This initiative highlights the definition of AI literacy as the knowledge and understanding necessary for individuals to engage in AI dialogue, make informed decisions, and understand its implications, including its capabilities, limitations, and ethical considerations. The curriculum also includes AI as a core component of the research experience (CURE) for undergraduate students, creating I-CURE courses that enable students to develop real-world application skills by working with private industry partners. The ultimate goal of this program is to create an AI-ready workforce with essential 21st-century competencies that cover the needs of the global workforce and governments [25].

The differences in AI education policies among various countries and higher education institutions can foster a more extensive discourse. These discussions will promote the prudent use of GenAI while also aiding in identifying best practices and addressing potential challenges. To ensure the responsible use of GenAI in higher education, there is a need for greater international co-operation between HEIs to share experiences and best times, and to develop clearer policy frameworks to promote innovation and improve the quality of teaching and learning. On this basis, HEIs should also focus on the development of digital skills for teaching personnel and students, and help teaching personnel and students to properly view and use GenAI tools to maximize their potential in facilitating teaching, research, and future career development. In addition, HEIs can also improve teaching personnel's and students' understanding of the use of AI and its tools in real life, work and industry through exchanges and cooperation with enterprises, so as to jointly promote the continuous development of this field.

Case Study: Evolution of the GenAI specification: the University of Hong Kong, China experience

The global stance of HEIs towards the regulation of GenAI has been evolving. Taking the University of Hong Kong (HKU) as an example, its transition from an initial ban on AI to a more flexible and considered approach reflects careful consideration of the potential impacts of GenAI in education.

In the early stages, HKU imposed a temporary ban on the use of ChatGPT, becoming the first and only institution in Hong Kong to implement such a prohibition. This move was a response to global concerns regarding ChatGPT and other AI tools, such as academic integrity, cheating, and the potential influence on traditional teaching methods.

Firstly, the ban was primarily motivated by concerns about the issues GenAI might trigger in education, especially those related to plagiarism and cheating. However, with the passage of time and increased international discussion on the regulation of AI, the University of Hong Kong adopted a more flexible and responsible stance [26]. After a series of discussions and the development of a long-term policy, the university announced the lifting of the ban on ChatGPT. This change demonstrates that HEIs, having become more aware of the potential value of AI technology, and trying to find a balance that allows students to take full advantage of the technology while ensuring its responsible and ethical use. The decision also reflects a synthesis of the different positions on AI in education globally. Following the lifting of the ban, HKU adopted an approach of restricting its use to prevent misuse by setting a limit of 20 questions per person per month [27]. This restriction was explained as helping to develop students' ability to think carefully about questions, which in turn increases the responsible use of AI tools. At the same time, HKU also emphasizes transparency and guides students to maintain proper citation when using AI tools to avoid plagiarism.

The case of HKU demonstrates a thoughtful consideration of the potential impacts of AI in education, attempting to regulate student behavior while allowing its use. This experience provides a model for other HEIs, showcasing how to strike a balance in the rapidly evolving field of AI technology, making it a beneficial supplement to the educational process rather than a replacement. It also reflects the trend among global HEIs to collectively explore and experiment with how to handle emerging technologies.

Looking ahead, HEIs need to tailor regulations and policies for the governance of AI and tools, encouraging the design and assessment of AI-related curricula on the one hand, and fostering the skills and judgment of students, faculty and staff in the application of AI on the other.

3.3 Recommendations to policy-makers

Based on research, HEIs in different countries have different understandings, views and attempts on emerging AI technologies. In formulating relevant policies, regulators and policymakers of HEIs need to consider the potential value and risks of technology and follow certain principles:

1. Policies should advocate for the benign use of AI, along with regulation and regular assessments

In formulating policies related to the use of AI, HEIs should guide departments, students, and faculty members to use AI tools in a benign manner. While encouraging exploration of the potential of AI, policies should incorporate monitoring and assessment guidelines. Monitoring and assessment not only facilitate improved communication with faculty and students but also help identify difficulties and improper behavior during the use of AI, providing assistance to faculty and students promptly. Collaboratively, this contributes to further refining and enhancing AI policies.

2. Policies should encourage faculty and students in HEIs to participate in discussions, formulation, and modification of policies related to AI governance.

The integration and application of AI in higher education are closely tied to the daily work of frontline faculty and students. Whether it is classroom instruction (online or offline), teacher–student communication, academic discussions and research, learning outcome assessments, or training, faculty and students are direct participants and users. Their voices deserve attention and consideration from university policymakers. Moreover, empirical studies indicate that students play an active role in drafting and implementing relevant policies[28]. Therefore, HEIs should actively invite faculty and students to participate in the formulation and modification of AI-related policies and standards.

3. Continuously deepening the integration of industry and education is more conducive to the integration of AI and education.

As technology suppliers, it is essential for enterprises to develop AI products catering to the needs of higher education teaching, learning, and research. Enterprises should create intelligent tools that align with the needs of teaching, learning, research, and management scenarios, integrating with existing educational technologies to achieve a comprehensive intelligent upgrade in higher education.

HEIs, as centers for talent development, should thoroughly understand the impact of AI on future economic and social development. They should actively collaborate with industries, reform curriculum systems, teaching personnel professional development mechanisms, and student training systems to cultivate talents with AI skills and literacy for the future economy and society. This approach supports the progression of the AI industry and contributes to the sustainable and healthy development of individuals and society.

4. AI governance should promote educational equity and narrow the digital divide

In AI governance, HEIs should strive for faculties, staff and students from different backgrounds to have equal access to relevant training, AI tools, and opportunities to integrate AI for research and practice, to promote the inclusion of technology for education, and to support the achievement of the UN Education 2030 Agenda.

From a **technical** standpoint, adhering to a "human-centric" approach and objectives, HEIs can incorporate mechanisms of "Equality by Design" in their policies and regulations concerning AI governance and collaboration with stakeholders. This ensures that algorithms treats individuals based on minimal biases[29].

Regarding **gender**, HEIs can actively encourage female faculty and students to participate more in discussions, research, and regulation of AI applications and governance, in an effort to bridge the digital divide between genders.

In terms of **background**, HEIs should pay more attention, allocate resources, and provide technical support to students from less developed regions, striving to reduce the digital divide among different areas. Additionally, when institutions from diverse regions collaborate on AI application and governance, they should take into account the current state of institutional resources in less developed regions, and provide full understanding and support to promote common progress.

5. Promoting the multi-stakeholder in the common governance framework and convene effort towards Higher Education AI Governance

AI by nature transcends the sectors, so the planning of effective AI and education policies requires consultation and collaboration with stakeholders across disciplines and sectors. Navigating this ever-changing landscape will require collaboration among HEIs, students, employers, sectors and professional bodies, with the ongoing review and evaluation of policies, principles, and their practical implementation.

International organizations play a leading role in setting standards globally and driving the establishment of global AI standards and regulations. International organizations such as UNESCO should actively advocate and promote cooperation with stakeholders to strengthen the integration and governance of AI in education. Effective integration of AI with higher education relies on active guidance from government departments. Facilitating the integration of AI in higher education requires comprehensive policy adjustments and robust ethical supervision from both government and HEIs, along with in-depth collaboration with global practitioners and researchers. Government departments and HEIs should proactively formulate effective policies to shape a supportive policy environment for the integration of AI in higher education. HEIs need to regularly assess policies guiding the use of AI by faculty and students, especially GenAI tools and their impact on teaching, learning, and assessment practices. This involves monitoring the effectiveness, fairness, and ethical impact of GenAI tools in academic applications, making timely adjustments to policies and procedures to ensure these tools evolve with the development of GenAI technology. Additionally, the collaboration between HEIs and international organizations can provide students with internship opportunities, enabling them to gain further insights into the application of AI under different national policy contexts and fostering professional competence to address the increasingly complex and changing technological landscape [30].

Enterprises, as pioneers of AI technology development and application, should take the initiative to launch guidelines for technology application to help HEIs and teaching personnel effectively apply technology to teaching, research and management. Enterprises should develop AI tools that meet the needs of teaching, learning, teaching and research, management and other scenarios, and take active action to support AI applications in HEIs and promote the integration of industry and education. In addition, enterprises should also consider the risk of widening the digital divide that may be caused by technological advances, and take the initiative to create conditions to help technologically underdeveloped countries and regions apply technology to narrow the digital divide and address educational inequality.

6. Localization and cross-cultural features in AI usage

Due to the differences in the level of technological development, cultural backgrounds, knowledge, and languages of countries around the world, there are challenges for HEIs in cross-border, cross-cultural AI integration, co-operation, and governance. Although there are policy recommendations and standards in different directions globally, HEIs should also respect and express the need for technological inclusiveness, and cultural representation in international cooperation from the perspective of localisation and cultural balance. Such an expression can lead international organisations and community to value flexibility in order to facilitate policymakers to come up with principles that accommodate differences in different countries and regions.

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04

Chapter 4

Helping Higher Education Institutions and Teaching Personnel Adapt to the New Demands of AI Technology under the Framework of IIOE

SIT Fung, SU Rui

UNESCO-ICHEI has consistently taken the institutional mission of empowering institutions with information and communication technology (ICT) capabilities, providing technical support and professional development programmes, serving the United Nations Sustainable Development Goal 4 and UNESCO's Education 2030 goals in the field of higher education — ensuring inclusive and equitable quality education and enabling lifelong learning opportunities for all. As the flagship project of UNESCO-ICHEI, IIOE is committed to

supporting the digital empowerment of partner HEIs in developing countries through a series of measures, such as public-private partnership, national center mechanisms, open digital learning platforms and smart classrooms. In the era of AI, IIOE will also undertake a new mission and actively advocate the organic integration of AI into higher education.

4.1 Current Status of IIOE Partners

Understanding the needs and status of partner institutions can help IIOE stakeholders to clearly define the direction. In October 2023, IIOE conducted a questionnaire at the institutional level based on the current partner network to understand the attitudes and needs of institutions towards AI technology, talent training, capacity building, etc. The questionnaire has so far reached 21 countries, and 61 representatives of various institutions in total have responded to the questionnaire, which clearly shows the current trend.

Question: **Do you think generative AI and AI technologies threaten or benefit higher education?**

● Strongly threatens	4
● Somewhat threatens	13
● No impact	0
● Somewhat benefits	19
● Strongly benefits	24



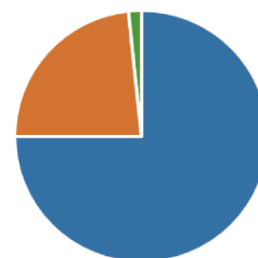
Question: **Do you think the rise of AI has an impact on students' readiness for their future careers?**

● Significantly decreases readiness	6
● Slightly decreases readiness	14
● No significant impact	3
● Slightly increases readiness	17
● Significantly increases readiness	20



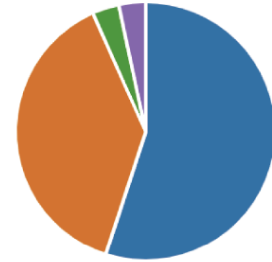
Question: **Do you think there is a need for the enhancement of institutional and organisational capabilities for the integration of AI technologies in teaching?**

● Strongly agree	45
● Agree	14
● Disagree	1
● Strongly disagree	0
● Don't know	0



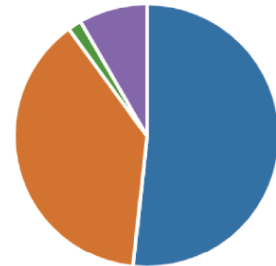
Question: **Do you think there is a need to acquire different software enhance computing power for your institution or organization?**

● Strongly agree	33
● Agree	23
● Disagree	2
● Strongly disagree	0
● Don't know	2



Question: **Do you think there is a need to obtain the right to engage in discussions with AI service providers for your institution or organisation?**

● Strongly agree	31
● Agree	23
● Disagree	1
● Strongly disagree	0
● Don't know	5



Question: **Do you think a curriculum for teaching personnel to build competencies commanding AI in teaching and learning is in demand for your institution or organisation?**

● Strongly agree	39
● Agree	20
● Disagree	1
● Strongly disagree	0
● Don't know	0



Question: **Has your organisation/institution established guidelines or policies on using AI in teaching and learning?**

● Yes	10
● No	50



Wordcloud of all responses regarding integrating AI into higher education



Through the results of the questionnaire and interviews with representatives of some institutions, IIOE learned the following:

Most HEIs are optimistic about AI technology, believing that HEIs should have the ability to teach and apply AI technology. They also hold the views that integrating AI into the process of student training can enhance the competitiveness of talents.

The current capacity of institutions for the application and management of AI is insufficient, and the vast majority of institutions (98%) believe that institutions should strengthen the ability to integrate AI technology into teaching through capacity building; At the same time, computing power and cost considerations also make most HEIs still in the lack of AI infrastructure. They need investment support, increasing computing power and software and personnel expenses.

At the same time, the majority of institutions expressed a desire for dialogue with large language model developers and service providers, reflecting concerns about the impact of AI technology, transparency, monitoring, fairness, privacy and other issues. While some institutions are uncertain about whether they should engage in dialogue with service providers, the needs of institutions or the relationship between AI and education remain unclear.

From the level of policy management and teaching support, only about 18% of institutions have issued AI-related policies and guidelines, which means that institutions need to put forward clear programs and plans to better integrate AI and higher education from the perspective of infrastructure upgrading, teaching improvement, talent training programs, technical governance, and how to promote AI-supported learning.

Based on the extensive research insights of the survey results, it is obvious that at present, HEIs maintain a relatively open and optimistic attitude toward the integration of AI technology and higher education, but also pay great attention to the use of technology. At present, IIOE's partner institutions are mainly ones in developing countries, and there is still a need for extensive access to open resources in terms of policy guidance and governance, technology access threshold, data and resource volume, and capacity building of teaching and administrative personnel. In addition, at the "Transforming Higher Education in the Age of AI" IIOE Global Partners Summit, about 200 attendees from 28 countries from Asia, Africa, Latin America, Middle East, and Europe, jointly expressed the demand that the integration of AI into higher education should actively carry out "extensive consultation, joint contribution and shared benefits". We look forward to exploring together through multilateral cooperation within the IIOE network. In response to these needs, IIOE will make corresponding plans in the subsequent sections of this white paper.

4.2 Initiatives for IIOE Eco-partners

Industry and institutions are important members of the IIOE ecosystem. How should IIOE, HEIs and private enterprises cooperate to respond to the above challenges brought by AI to education, so that AI can better serve the education industry? We have the following initiatives:

- 1. Strengthen cooperation between enterprises, HEIs and research institutions:** strengthen cooperation between enterprises, HEIs and research institutions, and jointly carry out research and development in the field of AI integration in higher education. By establishing industry–universities–research institutions alliances, industrial technology innovation strategic alliances and other forms, the in–depth AI industry–education integration can be enhanced.
- 2. Build corresponding curriculum system:** combined with the development needs of AI industry, HEIs need to add AI related courses. At the same time, enterprises should be encouraged to participate in curriculum construction, provide practical cases and technical support, and improve the feasibility and pertinence of courses.
- 3. Conduct teaching personnel training:** strengthen the training of AI skills for teaching personnel, improve teaching personnel’s professional quality in AI education. By holding training courses, seminars and other practices, invite AI experts from enterprises to deliver lectures and guidance.
- 4. Build internship and training bases:** encourage enterprises and HEIs to build AI internship and training bases, and provide students with opportunities for practical operation. Through internship and training, students can better understand industry trends, improve their practical ability and employment competitiveness.
- 5. Promote project cooperation:** encourage enterprises to cooperate with HEIs and research institutions in AI education–related projects, and jointly promote industry–education integration. Project cooperation can cover curriculum development, textbook compilation, teaching resources construction and other aspects.
- 6. Innovative talent training mode:** explore the talent training mode of close cooperation with enterprises, such as "employment–oriented" targeted commissioned training, "university–enterprise joint cultivation" and so on. Through in–depth cooperation with enterprises, improve the pertinence and effectiveness of talent training.
- 7. Information sharing and exchange:** establish the IIOE sharing platform to promote information exchange and resource sharing between partner enterprises, HEIs and research institutions. Through information sharing, it is helpful for all parties to better understand each other’s needs and advantages, and promote the in–depth development of industry–education integration.
- 8. Publicity and promotion:** By encouraging industry and HEIs to share and disseminate successful cases in exhibitions and summits, promote more stakeholders to obtain better technical support and effective application, and adapt to localized practices.

4.3 Current Status of IIOE

Equipment and software, as well as technical training modules, are essential components of basic capacity building and key pillars for applying technology to advance the digital transformation of the higher education ecosystem. Since its establishment, IIOE has provided support in teaching personnel capacity building, open digital learning platform and smart teaching environment, smart classroom and other projects, promoting the integration of emerging technologies, including AI technology, with higher education. The current initiatives and projects supported by the IIOE Platform are as follows:

4.3.1 iTA -- AI-empowered Teaching Assistant

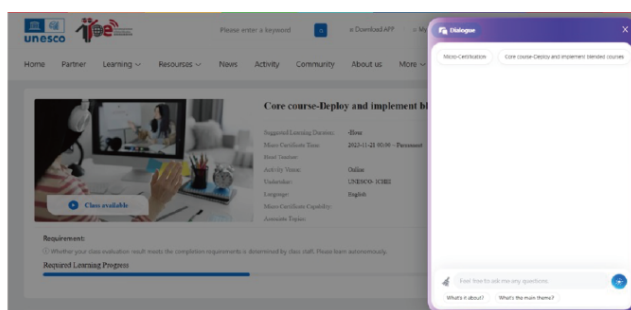
In order to better serve more than 12,000 teaching personnel in HEIs on the IIOE platform and provide them with more cutting-edge application services, IIOE 3.0 platform introduces the Intelligent Teaching Assistant (iTA) of ZhiXueYun (Beijing) Technology Co.,Ltd, combines the latest technological achievements, and connects to ChatGPT 4.0, bringing better educational supportive experience to educators.

iTA -- General Knowledge Service

Based on the general knowledge base of the IIOE platform, iTA -- General Knowledge Service will rely on natural language interaction to play multiple roles, such as knowledge assistant, domain expert, and creative assistant, to meet the learning needs of educator in higher education on the IIOE platform on demand, and provide continuous creative inspiration and rich educational resources.

iTA -- Personalized Knowledge Service

Based on the proprietary knowledge base of specific learning content (courses, training, micro-certificates, etc.), iTA -- Personalized Knowledge Service will simulate the lecturer, and provide IIOE learners with personalized tutoring, answering questions, and providing intelligent advice for a specific knowledge field.



Personalized Knowledge Service provided by iTA in courses

Whether educators in HEIs are facing the challenges of traditional classroom or online teaching, IIOE-iTA will be their right partner, providing them with intelligent answering, personalized advice and rich educational resources. In order to answer questions timely or help teaching personnel improve the quality of education, IIOE-iTA will provide comprehensive support to make education more innovative and efficient.

4.3.2 IIOE (Shenzhen, China) AI Lab

In order to showcase the application scenarios of AI in the field of education, IIOE, relying on the Southern University of Science and Technology (SUSTech) and combining with enterprise partners, introduces cutting-edge technology in the field of AI to present the best practices of integration of education and technology. At the same time, it provides a teaching innovative practice platform for cooperative HEIs and SUSTech.

The main functions of the laboratory include: smart classroom basic module, Automatic-Speech-Recognition and Text-to-Speech (ASR&TTS) (in-class text recording and automatic sorting of key points, text reading), Digital human (applying virtual images instead of human teacher in live streaming), XR, IoT control, programming robot, Intelligent Operations & Analytics, holographic projection, live broadcast, teaching quality assessment, etc.

The design frame is as follows:

Application	Smart Teaching	Smart Classroom	Personalized Learning	Personalized Learning	Simulation Teaching	Remote Teaching	Online Learning	Twin Teaching
	Smart Management	Smart Operations	Smart Analytics	Smart Evaluation	Smart Operations	Smart Decision-Making	Other	
Software	International Institute of Online Education(IIOE)	Chat GPT, iFLYTEK Spark, ERNIE Bot, TableGPT	Speech Recognition/ Language Control	Teaching/Learning Behavior Data Analysis Software	Intelligent Digital Persona			
		Zhixueyun Holographic Projection	KMAX VR Courseware Software	Other Educational Support Software	Text-to-Speech(TTS)			
Technology	Artificial Intelligent	Big Data	Internet of Things(IoT)	Cloud Computing	Blockchain	Virtual Reality(VR)		
Hardware	Based on Smart Classroom (Seewo, Createview, OS-Easy)	Smart Screens	Wireless Screen Mirroring	Microphones/ Speakers	Computers/ Terminals	Photography/ Green Screen Equipment	Other	
	Other Cutting-Edge Hardware Devices	Robots (UBTECH)	Live Broadcasting, Virtual Background (Lifu, Createview, Shineon)	XR Devices (KMAX, Createview, Baidu, Apple)	Drones(DJI)	3D Scanning Equipment	Other	
Infrastructure and Environment	Spatial Infrastructure	Desk and Chair Space Layout	Lighting Facilities	Power Distribution Facilities	Ventilation and Air Conditioning Facilities	Other		
	Network Security Equipment	5G/6G Networks	WIFI	Storage Devices	Network Service Facilities	Other		

Objectives of IIOE (Shenzhen, China) AI Lab:

- Showcase cutting-edge technology for partner HEIs
- Support the training of teaching personnel of SUSTech
- Support the innovative teaching practice of SUSTech
- Provide Asian and African HEIs with smart educational programs for reference and conduct training visits

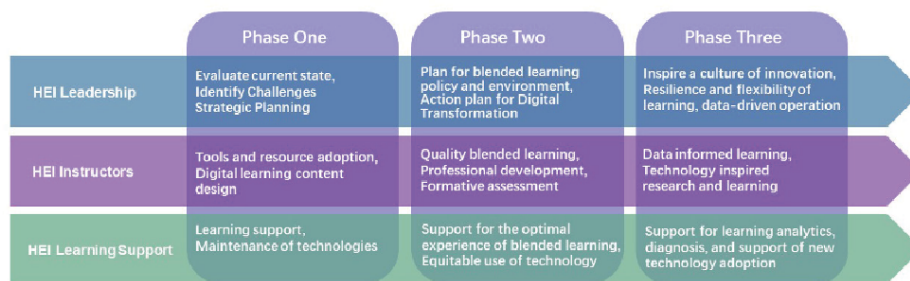
Expected results:

- Improve teaching personnel’s understanding and application of AI in teaching
- Carry out AI laboratory teaching practice
- Optimize the AI laboratory program and put forward proposals for different stages of construction
- Provide cases for AI applications in partner HEIs

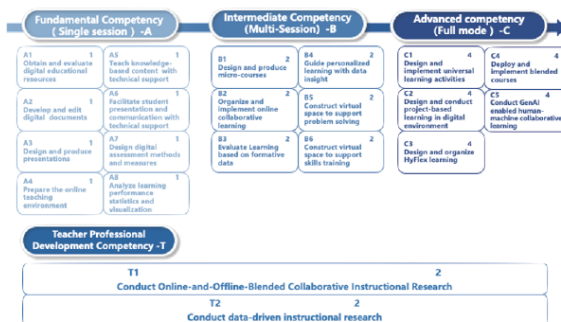
4.3.3 Teaching Personnel Capacity Building and Teaching Empowerment

IIOE consistently regards the empowerment of educators' digital capabilities as one of its crucial missions, aiming to facilitate increased participation of more institutions and teaching personnel in the digital transformation of higher education. In the aspect of the enhancement of teaching personnel digital teaching design capabilities, IIOE has collaboratively researched and developed a digital transformation framework for higher education instructions. It provides a wealth of ICT capacity-building packages, including courses, training, and webinars related to cloud computing, big data, AI, and IoT on a public digital learning platform.

In 2023, IIOE and the team of School of Open Learning and Education of East China Normal University jointly developed the IIOE Digital Competence Reference Framework for Higher Education (hereinafter referred to as the "Reference Framework"), with the micro-certification as the starting point, to provide partner institutions in developing countries with more public content for professional development and more mechanisms for building teaching personnel capacity building resources, thereby promoting the IIOE platform to build more high-quality and widely-recognized content. The program provides IIOE's partners with the opportunities to share teaching experiences and participate in international teaching research; Digital empowerment resources and framework guidance for curriculum planning were also provided to the Teaching Personnel Development Centre in HEIs. Under the micro-certification framework, IIOE has also teamed up with enterprise partners to provide time-effective open education resources from the industry, ensuring that emerging technologies can reach educators and colleges in a timely manner, and solving core problems such as budget constraints and insufficient training personnel. Its openness ensures that each partner institution can customize appropriate localized content based on its own needs, and tries to elevate the professional development of teaching personnel in HEIs to a more important position to ensure high quality teaching. Currently, in the "Reference Framework", how to use GenAI content application has been covered at the level of instruction; In line with the needs of partners and institutions in the future, IIOE will also further strengthen AI technologies such as assessment, teaching support assistance, technology assessment, etc., and integrate these capabilities into the current framework.



IIOE Course Framework



IIOE Higher Education Teaching Personnel Digital Competency Reference Framework

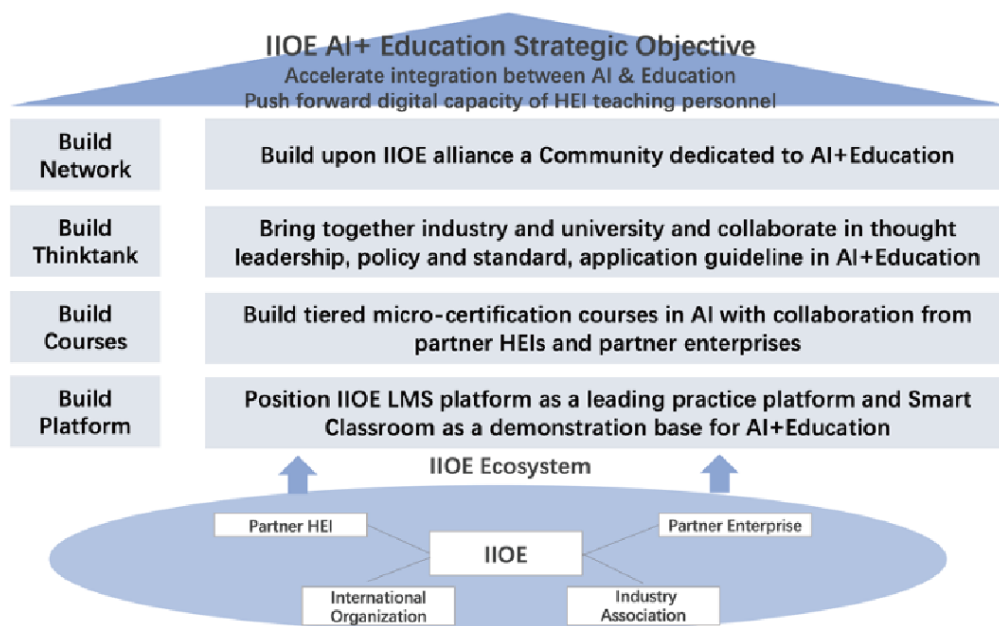
Based on the current framework, there is still room for UNESCO-ICHEI and IIOE to exert and deepen their efforts. IIOE is developing new plans for the future on strengthening the linkage and collaborative dialogue between industry, institutions, policies and international organizations, conducting research, conveying the needs of HEIs to industry, promoting the good use of AI, and supporting institutions to identify appropriate technologies for empowering teaching and learning.

4.4 IIOE's Future Action Plan

In the new era, IIOE will continue to respond to the unified framework of UNESCO and use the opportunities brought by emerging technologies to serve the achievement of the Education 2030 goals and Education 2050 goals. At the same time, it will serve the overall objective of UNESCO-ICHEI to connect the developing countries in the Global South and promote the effective application and integration of AI in the higher education system in line with China's goal of digital transformation and innovation in education, and will actively pay attention to and contribute to UNESCO's monitoring and evaluation of the impact of technology on education, policy advice and rule-making.

As a collaboration network for the digital transformation of higher education institutions in developing countries, IIOE aims to create a more open and shared digital ecosystem, deepen the cooperation between industries and HEIs, and accelerate the deep integration of AI technology into education. IIOE will launch a series of more forward-looking and targeted policy advocacy on education informatization, especially in the field of AI, to provide HEIs and teaching personnel in developing countries with practical support in strategic research, policy, governance, resources, tools, empowerment, ethical considerations, evaluation and monitoring, helping them use AI tools effectively and maximize their benefits. At the same time, IIOE will cooperate with industry and other international organizations to promote enterprises and industries to understand the needs of the field of education, and jointly participate in international activities such as standard establishment, effectiveness evaluation, technology exchange and sharing, etc.

Combining IIOE's own experience to provide effective support and guidance for partners within the IIOE network, IIOE will carry out a series of initiatives from the following levels:



4.4.1 Think Tanks Construction: Deepen Enterprise-Higher Education Integration in the Field of AI

Build an AI+education think tank. IIOE carries out countermeasure research and a series of projects towards the common goal of promoting AI integration in higher education in collaboration with domestic and overseas experts in the field of AI+education, representatives of IIOE partner institutions, academic research institutions, international organizations and industry associations, etc.

Promote standard development and support strategy research: Form AI+ education application standards based on consensus between IIOE partners, supporting partners to develop AI policy framework, application ethics, governance plans, monitoring and evaluation, and other documents, to ensure that the use of AI technology is consistent with global practices and standards.

Establish an evaluation framework, detailing the criteria and methods for evaluating the use of AI and key measurement indicators. This could include score sheets, checklists or assessment sheets that provide structured guidance to educators and administrators to support the technical governance of institutions;

Participate in the formulation of relevant standards and norms in the field of AI+ education by UNESCO, academic institutions and national government departments to ensure the inclusiveness of policy systems.

4.4.2 Curriculum Construction: Create a Multi-Level AI Micro-Certificate Course System

Based on the released "IIOE Digital Competence Reference Framework for Higher Education Teaching Personnel v1.0" and the micro-certificate Framework for higher education teaching personnel's digital competence, to create AI and GenAI-focused modules and micro-certificate courses, training and open courses to provide teaching personnel with high-quality open educational resources (OER) in the field of AI;

Continue to update AI courses for timeliness, ensure the quality and relevance of OER, and lead the cultivation of AI talents;

Deepen curriculum content cooperation with partner HEIs and enterprises, integrate high-quality resources of HEIs and enterprises, and provide important input for HEIs to build AI professional curriculum system and teaching personnel digital ability training system;

4.4.3 Platform Construction: Build a Demonstration Platform for AI+ education and Teaching Application around IIOE Platform

Leading AI+ education applications and tools from the industry will be first deployed on the IIOE platform as a model point, leading the AI + Education evolution planning in IIOE partner HEIs;

Use IIOE AI Lab to update products and solutions from the industry in a timely manner and present them globally, leading the AI+ education revolution in IIOE partner HEIs;

IIOE will be positioned as a platform based on partners' digital needs through multiple channels such as software, hardware, policy, and capacity building, to provide practical cases for the digital transformation of IIOE partner HEIs.

4.4.4 Circle Construction: Rely on IIOE Platform to Establish and Operate AI+ Education Enterprise-Higher Education Partnership and Practice Community

Deepen the existing national centre mechanism to support the sharing of industry experience in the IIOE network and meet the needs of all parties;

Regular selection of global best practices in AI+ education and establishment of ‘UNESCO-ICHEI Higher Education Digitalisation Pioneer Case Award’ for sharing and exchange of IIOE partner alliance to promote the application of AI+ education;

Recommend AI+ educational tools and hold regular seminars on teaching personnel AI capacity building;

Regularly share research results in the field of AI+ education, including research reports in the field of educational equity and gender equality;

Improve the dialogue mechanism, promote the sharing and exchange of experience between teaching personnel and enterprises, achieve objective alignment, and co-create an educational paradigm for the effective integration of AI and higher education;

Initiate and participate in regional, national and international policy dialogues to promote the healthy development of AI technology in the field of education, while supporting the effective implementation of policies.

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